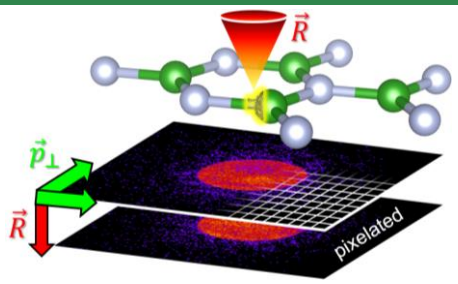
LMU

PhD Positions

11/2023

Electron microscopy – Inverse scattering – 4D imaging

Inverse Problem



Nature challenges Nanoscience by erasing the phase of a wave function from any microscopic recording – but it is the phase that contains the crucial information about nano-objects under study. Retrieving the **atomic structure** of **Quantum devices, 2D Materials, Viruses** or **Proteins** poses the **famous phaseless inverse multiple scattering problem**.

Within the team of AK Müller-Caspary, physicists and physical chemists **develop & apply pioneering electron microscopy** setups, inverse scattering methods and algorithms for phase retrieval from 4D experimental data: Recording a full diffraction pattern at each position of a scanning beam in a transmission electron microscope (TEM) renders determining atomic structures a well-posed problem – only thermal motion limits resolution to date.

Interested?

Join our team as a PhD student and push the limits of electron microscopy to answer the question „Which atom is where“ in

- Solid-state quantum devices (nanowires, 2D materials, ferroelectrics)
- Biological objects using 4D-cryo-TEM (Proteins, viruses, deseased cells)
- Organic nanostructures (covalent/metal organic frameworks, Origami-DNA)

You bring (ideally but not necessarily):

- Interest in phase retrieval, mapping uncharted territory by new methodologies experimentally and/or theoretically
- Background in physics, scattering theory, physical or theoretical chemistry
- Programming experience (e.g. Python, Matlab, C, C++, basic level)
- Scientific creativity & enthusiasm

We offer

- A variety of PhD projects to be shaped flexibly according to your skills with experimental or theoretical focus – start as soon as possible.
- Cutting-edge aberration-corrected TEM and computational hardware.
- A vivid, international and interdisciplinary network of groups in solid-state physics, chemistry, structural biology, mathematics, electron microscopy.
- Integration in several large-scale projects (DFG excellence cluster, ERC Synergy project 4D BioSTEM).
- Work in a dynamic, cooperative group with flexible work schedule.

Contact:
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DFG Deutsche Forschungsgemeinschaft

erc European Research Council Established by the European Commission

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